



BEGINNING OF THE UNIVERSE AND MASTER EQUATION FOR THEORY OF EVERYTHING

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ABSTRACT

In this paper, I have proved from statistical point of view that the universe has begun from a single completely ordered state. Then I have derived the single equation for unified force, theory of everything using the concept of symmetry and entropy. In this paper I have discussed how fundamental forces act in macroscopic and microscopic world, what is time, how elementary particles created from the ordered state.

KEYWORDS: Origin of Universe, Theory of Everything, Unified Theory, Entropy, Symmetry, Fundamental Forces.

1. INTRODUCTION:

We know different particles and states of matter having no rest mass, some having no spin, no charge, some are shapeless etc. But a complete ordered state is that state, which has no entropy and no property. We can not observe any property in the ordered state or latent state.

From Boltzmann's relation, $S = k_b \log \Omega$ (1)

Where, S = Entropy, k_b = Boltzmann's constant, Ω = No. of possible states

Let's apply equation (1) to understand creation of universe. If the universe began from nothing, then there is no state. So $\Omega=0$

Then $S = k_b \log \Omega = k_b \log 0 =$ undefined or not real (2)

So universe must have a beginning from a state having zero entropy. Since there is no time at beginning, so no entropy is there. Everything was just seized. So the universe began from a single ordered state which may be called as a single unified state or latent state. i.e $\Omega=1$

So, $S = k_b \log \Omega = k_b \log 1 = 0$ (3)

The state has no entropy. So it is a completely ordered state. This state had no shape, no property, no time. Since there was no shape or property to be created, so that state was eternal.

When this ordered state gets disturbed due to any reason, then entropy increases. Consequently time started. This influence of entropy is time. When entropy increased, then vibrations occur & due to different frequencies different types of particles, quarks, shapes, properties, forces were created. That one ordered state became more than one states of matter.

Now, come to the fundamental forces. Entropy changes in two manner, - first is 'Motion' and second is 'Disturbance'. Large scale entropy change is due to motion. Entropy change at small scale is due to disturbances. Motion dominates the macroscopic classical world whereas disturbances is dominant at quantum world. Mass is the resistance to accelerated motion or large scale entropy change and gravity is caused by the mass. So gravity is related to accelerated motion. That's why gravitational effects are equivalent to an accelerated system, which is called as principle of equivalence. Its consequences are gravitational redshift, gravitational lensing etc. Gravity is the main cause of this existence of universe, formation of stars, galaxy, solar system, planetary motion etc.

Strong nuclear force is the resistance to disturbance or small scale entropy change. It binds quarks, protons, neutrons and it is main cause of formation of nucleus. When this symmetry between neutrons and protons in the nucleus breaks then the nuclear explosion happens.

But weak force is the assistance to disturbance or entropy change. It causes the decay process. Due to the disturbance caused by charge, electric force arises. Charge in motion creates magnetic field. Both these forces were unified by Maxwell as electromagnetic force. The forces which assist motion and disturbance are weak force and electromagnetic force. Both these forces are unified by Salam-Glashow-Weinberg as electroweak force through gauge symmetry. When this spontaneous symmetry breaks, the electroweak force separated into two different forces.

Now, take the fundamental unit of mass a electron-proton mass. e_m = mass of electron, p_m = mass of proton

Unequal (asymmetric) distribution of electron-proton mass in a system leads to electromagnetic field. Because if the masses are equally present, then within an atom the equal no. of protons and electrons combine and cancel out. So net charge becomes zero. Only mass will be present and no charge is there. So only gravity works for the whole system. If the system is subjected to unequal distribution of electrons and protons then it leads to net nonzero charge. Consequently there comes electromagnetic force. Gravity can be unified with electromagnetic force through electron-proton symmetry.

2. EQUATION FOR THEORY OF EVERYTHING:

Considering the above theory, I have derived an equation for unified force.

Let's define 4 new types of function;

i) Symmetry function (S, S'):

It can be defined as, $S_n^m = 1$ for $m=n$

$= 0$ for $m \neq n$

And $S_n'^m = 1$ for $m \neq n$

$= 0$ for $m=n$

ii) Gauge symmetry function (G, \bar{G}):

It can be defined as, $G =$ gauge symmetry $= 1$ for F_{EW} (electroweak force)

$= 0$ for $F_E + F_W$

And $\bar{G} =$ gauge symmetry break $= 1$ for $F_E + F_W$

$= 0$ for F_{EW}

iii) Resistive entropy change function (E, \bar{E}):

It can be defined as, $E_d^m = 1$ for $m \neq 0$ and $d=0$

$= 0$ for $d \neq 0$ and $m=0$

$\bar{E}_d^m = 1$ for $m=0$ and $d \neq 0$

$= 0$ for $m \neq 0$ and $d=0$

where, $m =$ motion and $d =$ disturbance

iv) Assistant entropy change function ($\epsilon_d^m, \vartheta_d^m$):

It can be defined as, $\epsilon_d^m = 1$ for $m \neq 0$ and $d=0$

$= 0$ for $m=0$ and $d \neq 0$

$\vartheta_d^m = 1$ for $m=0$ and $d \neq 0$

$= 0$ for $m \neq 0$ and $d=0$

Now take F_G =Gravity, $F_{G-residue}$ =Gravity due to each single free charge

F_E =Electric force, F_M =Magnetic force, F_{EW} =Electroweak force

F_{SN} =Strong nuclear force, F_w =weak nuclear force

q =Quark symmetry between two quarks, e =No. of electrons

p =No. of protons, n =No. of neutrons, C =Velocity of light

Then, Unified force= $F_{unified}$

$$F_{unified} = \Phi [S_p^e \{ F_E + \epsilon_d^m F_M \} + \mathfrak{A}_d^m F_w] + G [F_{EW}] + S_p^e [E_d^m F_G] \\ + (S_n^p + S_q) E_d^m F_{SN} + S_p^e F_{G-residue} + S_p^p \mathfrak{A}_d^m \frac{1}{C} \frac{dE}{dt} \quad (4)$$

Here, $\frac{1}{C} \frac{dE}{dt} = F' = \text{Force by which nuclear explosion carried out}$

$$F' = \frac{dP}{dT} = \frac{d(\frac{E}{C})}{dt}$$

$$\text{or, } \frac{dP}{dT} = \frac{1}{C} \frac{dE}{dt}$$

$$\text{or, } P = \frac{E}{C}$$

$$\text{or, } E = PC$$

$$\text{or, } E = (mc) c = mc^2$$

Equation (4) is the master equation for theory of everything and unified force.

Equation (5) is the mass-energy relation derived from equation (4).

For any reason, when ordered state became disordered, then the term or force $S_p^p \mathfrak{A}_d^m \frac{1}{C} \frac{dE}{dt}$ in equation (4) helps to continue that entropy change process and supplies energy for the progress of creation process. It is a destructive force like the force causing nuclear explosion.

When ordered state was subjected to entropy change, then unified force became equal to entropic force and thereafter all fundamental forces appeared.

$$\text{i.e. } F_{unified} = (\epsilon_d^m + \mathfrak{A}_d^m) [T \nabla S]$$

Where, T =Temperature of state

$$\nabla S = \text{Change in entropy, } S = k_b \log \Omega$$

Let's understand equation (4) by taking into consider each term separately.

i) Take the first term in RHS of equation (4) i.e. $\Phi [S_p^e \{ F_E + \epsilon_d^m F_M \} + \mathfrak{A}_d^m F_w]$

In the above term when symmetry between equal no. of electrons and protons breaks, then this unequal distribution creates charge and so causes electric force(F_E). But when the charge is in motion, then ϵ_d^m becomes equal to one. So, magnetic force(F_M) exists. If there is no motion, then ϵ_d^m becomes zero and so no magnetic force is there and only electric force exists. If there is a change in entropy due to disturbance then \mathfrak{A}_d^m becomes one and weak force exists. If the particle or nucleus is stable then no change in entropy and \mathfrak{A}_d^m becomes zero. So weak force vanishes. Finally both of these forces, electromagnetic and weak force, are separated from unified force due to gauge symmetry breaking (G). Here G is one, since the two forces are separated.

ii) Take the second term in RHS of equation (4) i.e. $G [F_{EW}]$

In the above term, the electric force and weak force are unified. So gauge symmetry(G) becomes one and electroweak force exist and simultaneously G becomes zero in the first term, which indicates the unification of electromagnetic force and weak force.

iii) Take the third term in RHS of equation (4) i.e. $(S_n^p + S_q) E_d^m F_{SN}$

In the above term, the equal no. of electron(e) and proton(p) makes the total charge zero and S_p^p becomes one. Then due to resistance to accelerated motion i.e resistance to entropy change, the E_d^m function becomes one and gravity(F_G) Works. If the opposite case is considered, then S_p^e becomes zero and hence grav-

ity can not be observed.

iv) Take the fourth term in RHS of equation (4) i.e. $(S_n^p + S_q) E_d^m F_{SN}$

In the above term, when there is symmetry between proton-neutron and quarks then S_n^p and S_q becomes one. So, nucleus is formed and the resistance to disturbance within nucleus E_d^m becomes one. Hence strong nuclear force (F_{SN}) works. In the opposite sense, when symmetry breaks, the $(S_n^p + S_q)$ becomes zero and F_{SN} vanishes. In this case S_n^p becomes one and sixth term of equation (4) arises i.e the force which helps in nuclear explosion.

v) Take the fifth term in RHS of equation (4) i.e. $S_p^e F_{G-residue}$

In the above term, when symmetry between electrons and protons breaks, then free charges are created. S_p^e becomes one and $F_{G-residue}$ exists, which is the gravity due to these free charges.

3. PRINCIPLE OF LEAST ACTION:

Principle of least action is very important tool in both classical and quantum mechanics. We can get the result of principle of least action from equation (4).

Let's take the sixth term of equation (4),

$$F' = \frac{1}{C} \frac{dE}{dt}$$

$$\text{or, } P = \frac{E}{C}$$

$$\text{or, } E = PC$$

$$\text{Action} = S = \int E dt = \int P C dt$$

$$\text{or, } S = \int E dt = \int P dq \quad (\text{since } C dt = P dq) \quad (7)$$

Let E =Energy= L =Lagrangian

Then, according to Lagrange's principle of least action,

$$\text{From (7) } \delta S = \delta \int L dt = 0 \quad (8)$$

According to Euler's principle of least action,

$$\text{From (7) } \delta S = \delta \int P dq = 0 \quad (9)$$

From equation (8), we can derive Lagrange's equation of motion, Hamilton's equation of motion, variational principle, canonical transformation, Hamilton-Jacobi equation, Schrodinger's wave equation, Kepler's planetary laws, Fermat's principle of least path etc., which are the core theories of classical mechanics and quantum mechanics.

4. CONCLUSION:

In the above discussions, it is concluded that equation (4) and equation (6) contain theory of everything. I have unified all forces and made a single equation for this. So, this equation is the master equation of the universe and nature.

Acknowledgement:

I am inspired by the dreams of Albert Einstein to make a single theory for everything and this inspiration took me to derive the equation. Further I am motivated by the words of Indian philosopher swami Vivekananda that there is a unity behind every laws of nature. I am thankful to my father and my friends, who encouraged me.